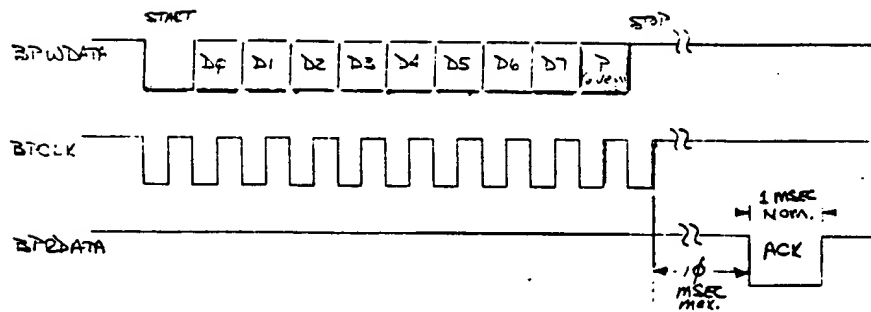
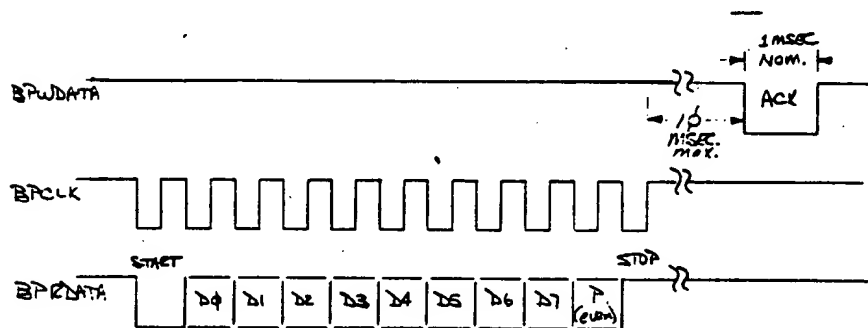


# APPENDIX B

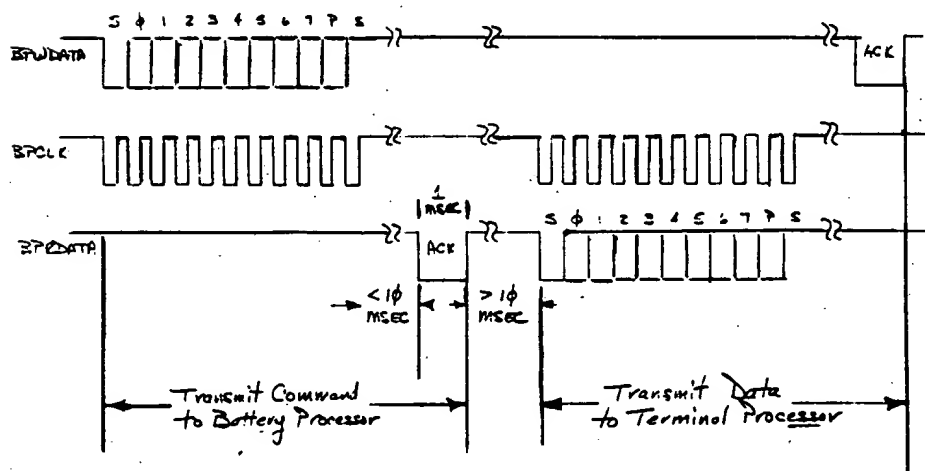
STEVEN E. KOENCK  
APPLICATION FOR PATENT "BATTERY  
CONDITIONING SYSTEM HAVING  
COMMUNICATION WITH BATTERY  
PARAMETER MEMORY MEANS IN  
CONJUNCTION WITH BATTERY  
CONDITIONING" ATTY.DOCKET 5717-Y



Terminal to Battery Processor Communication

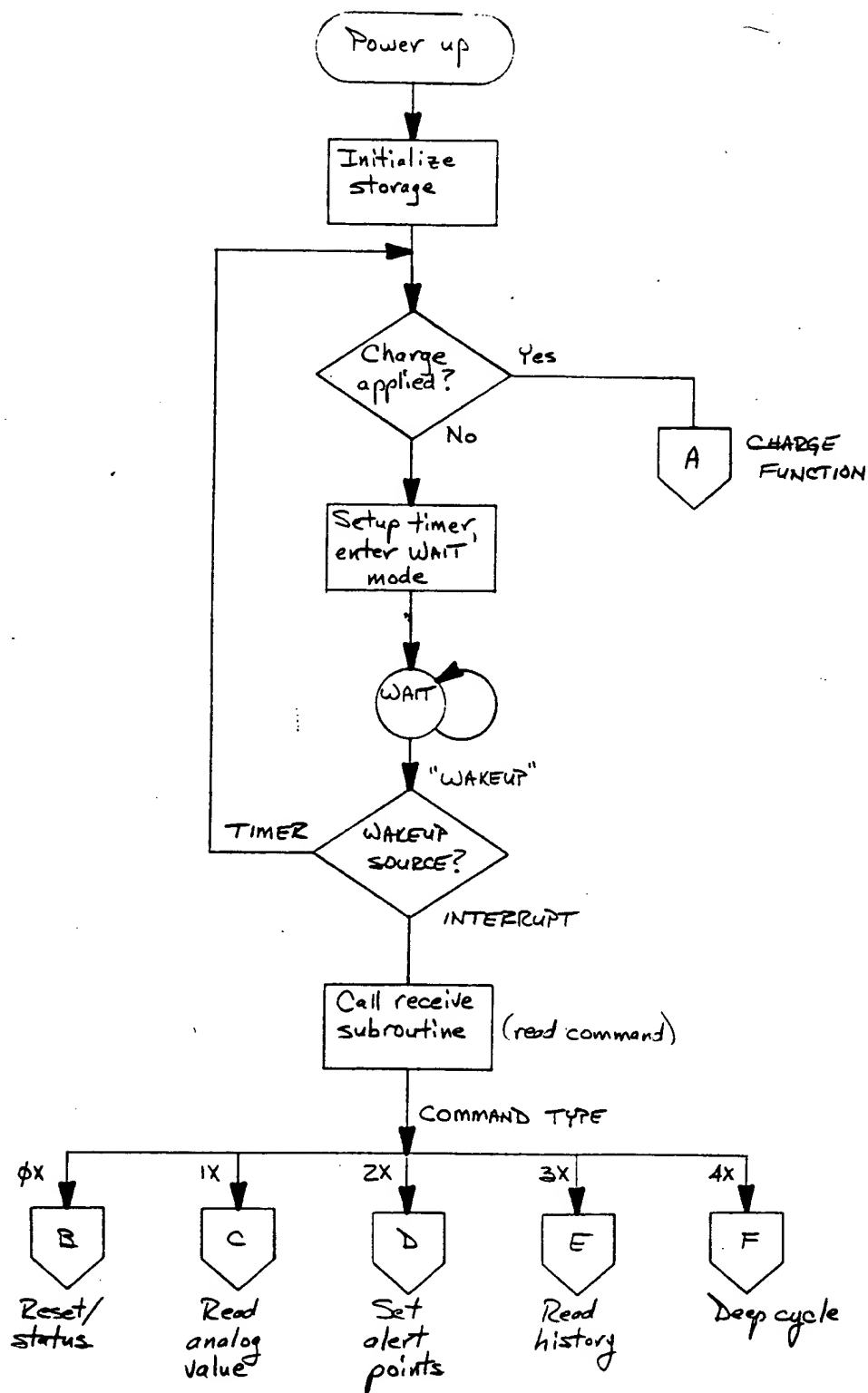


Battery Processor to Terminal Communication

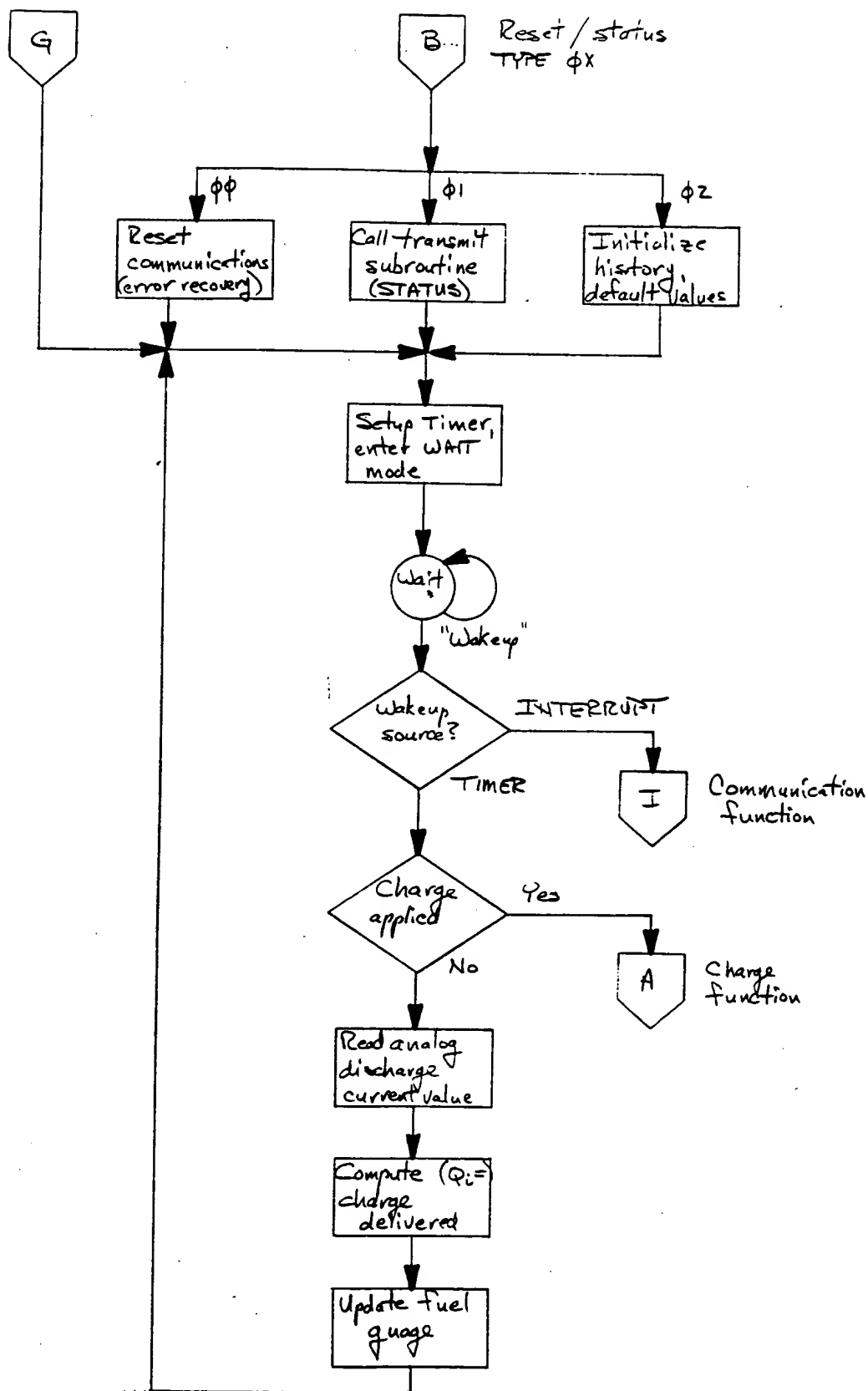


Command/Response Communication Protocol

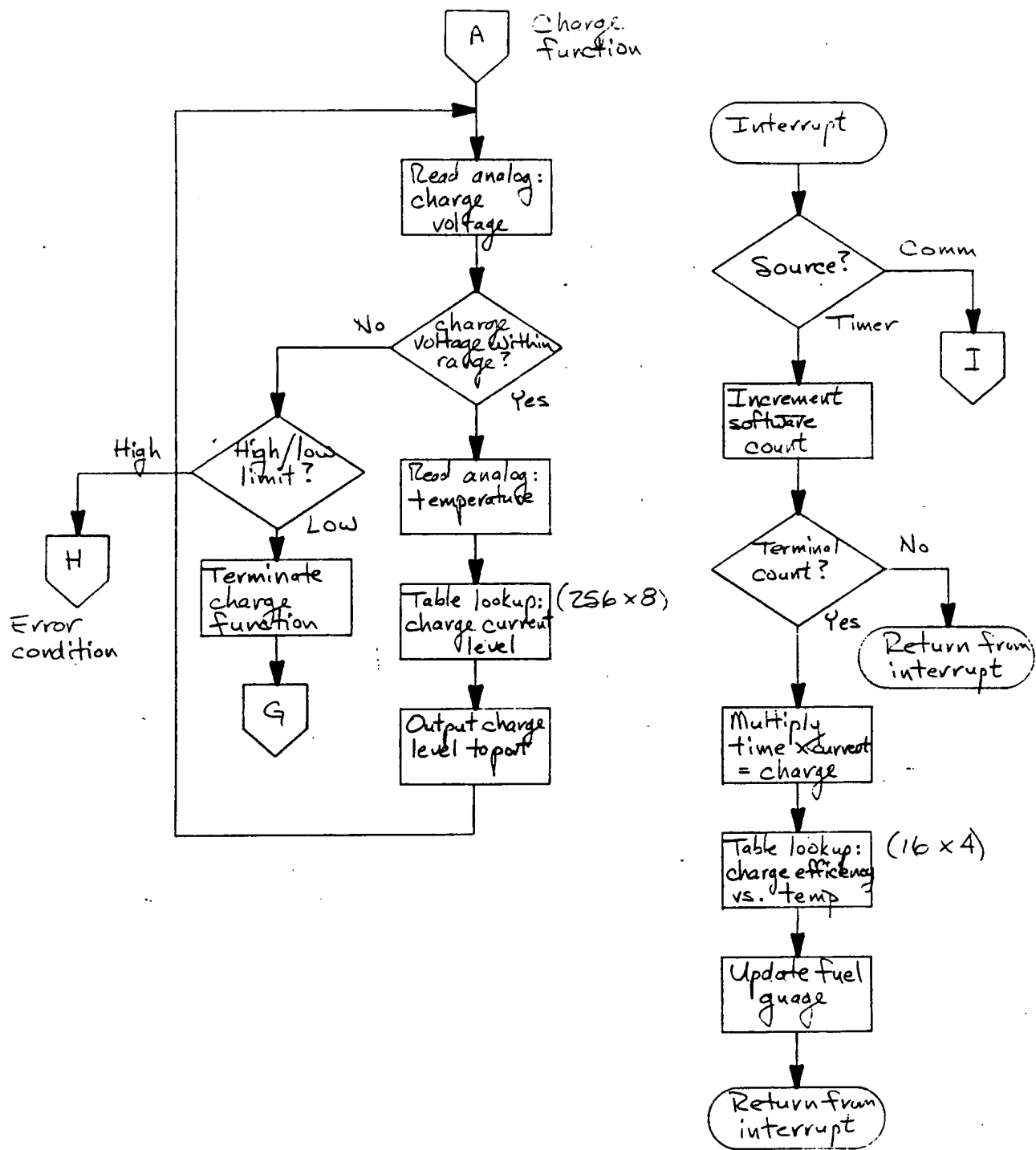
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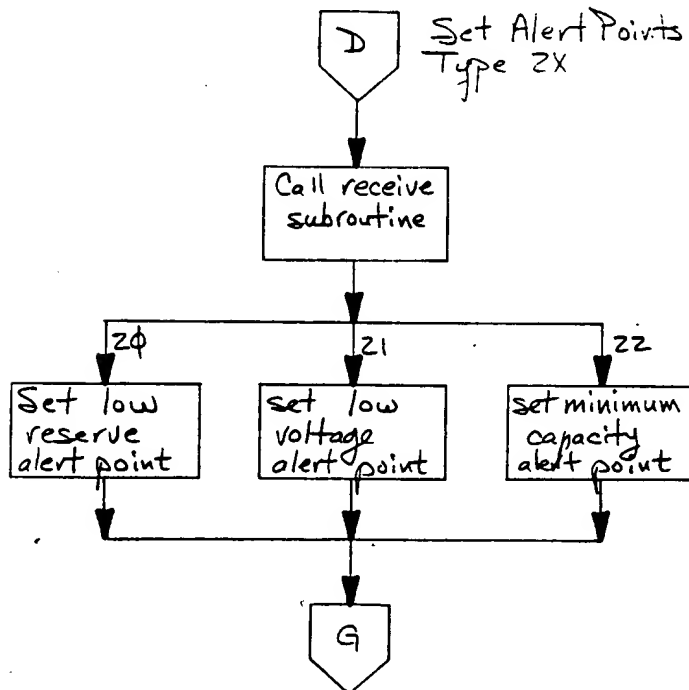
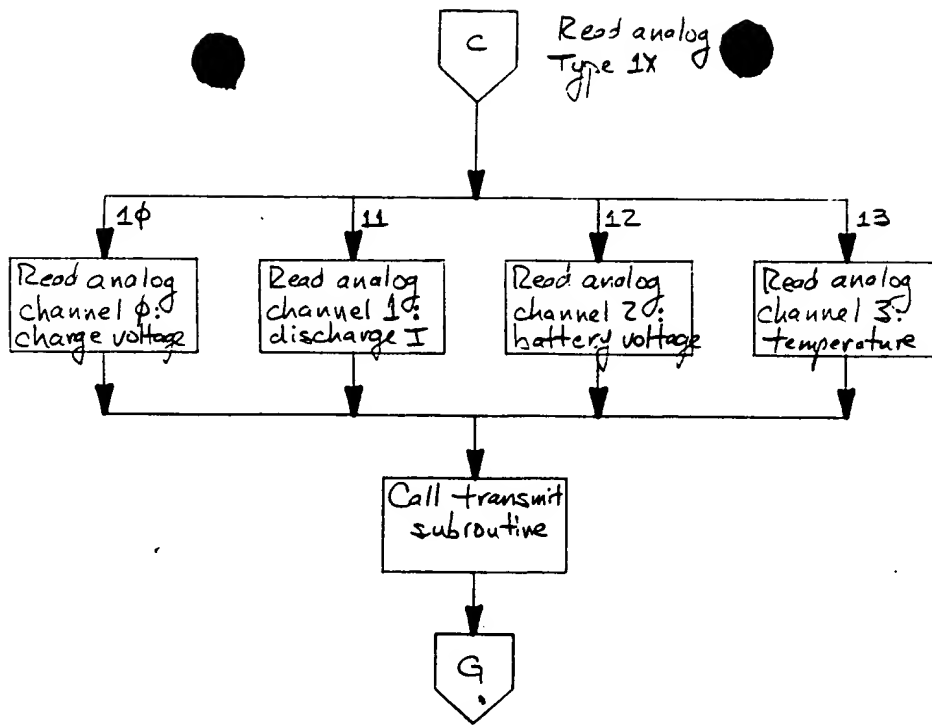


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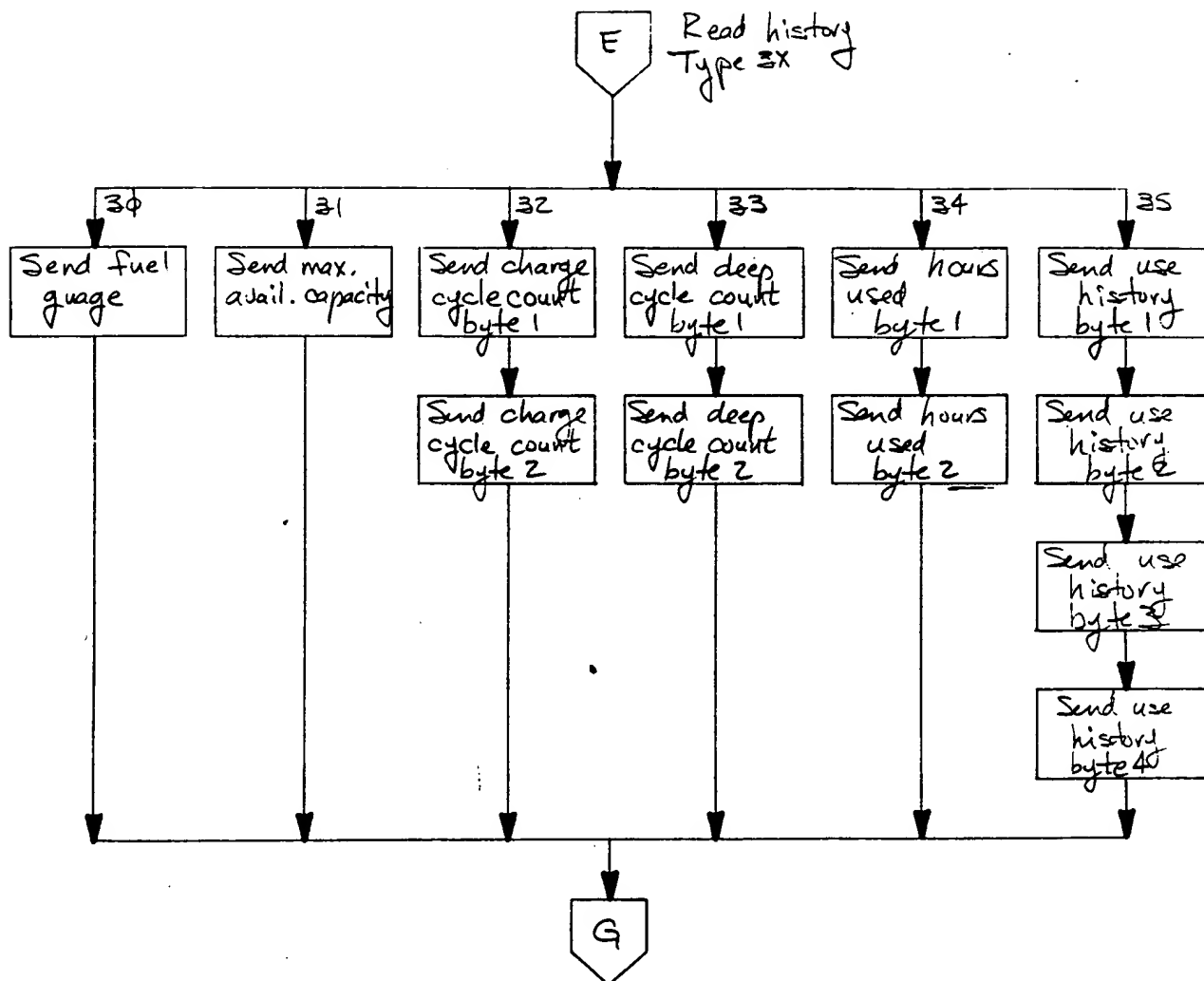


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Note: Processor does not enter WAIT condition during charge.



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F Deep Cycle function  
Type 4X

Charge  
voltage within  
range?

No

Yes

H

Error  
condition.

Turn on  
discharge  
load

Read analog:  
battery  
voltage

read  
charge:  
> 75%?

No

battery  
voltage  
= 4.0V

Yes

turn off  
discharge load

Set new  
max. avail  
capacity

Increment  
deep cycle  
count

Update ΔC:  
max. vs. present  
capacity

A

Charge  
function

Deep cycle: consider full  
charge cycle before  
deep discharge

Note: Processor does not enter WAIT  
condition during deep discharge

Interrupt

Source?

Comm

Timer

I

Increment  
software  
count

terminal  
count?

No

Return from  
Interrupt

Yes

Read analog:  
discharge  
current

Multiply  
time x current  
= charge

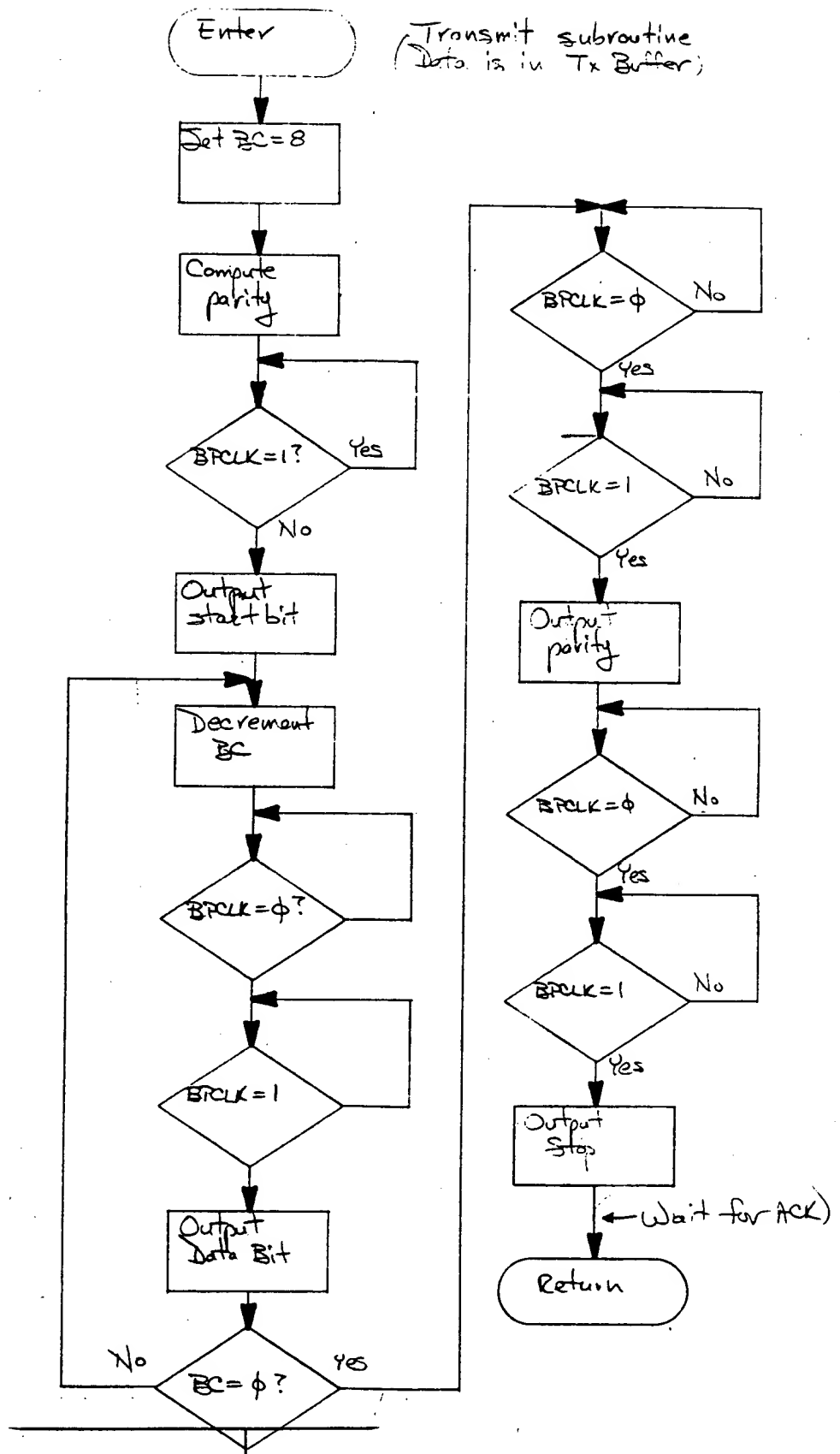
(updating  
new C/Volw)

Return from  
Interrupt

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### Charge level lookup table:

Input variables: 1. Temperature  
2. Charge voltage  
3. Fuel gauge

1. Temperature: table increments of  $4^{\circ}\text{C} \times 16 \text{ steps} = 64^{\circ}\text{C}$ ,  $-14^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$   
temperatures below  $-14^{\circ}\text{C}$  use  $-14^{\circ}\text{C}$  value  
temperatures above  $+50^{\circ}\text{C}$  use  $+50^{\circ}\text{C}$  value

2. Charge voltage: table increments of  $1.28 \text{ volts} \times 8 \text{ steps} = 10.24 \text{ Volts}$   
 $7.0 < V_{\text{CHG}} < 17.24 \text{ V.}$

voltages below 7 volts or above 17.24 volts will cause the charge level to be turned off and an error condition to be transmitted to the terminal processor

3. Fuel gauge: 4 steps:  
0-25%  
25-50%  
50-75%  
75-100%

TABLE OUTPUT: 4 bits, binary weighted  
charge level =  $32 \text{ ma/step}$   
 $0 \leq I_{\text{CHG}} \leq 480 \text{ ma}$

TABLE SIZE:

$$16 \times 8 \times 2 = 256 \text{ Bytes}$$

①	②	③
Temp	Chg voltage	%C (4 nibbles)

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